5/23/96 P.V.

MEMORANDUM

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To: Sheri Bianchin
Steve Mrkvika
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Date: May 23, 1996

cc: Ron Frehner

From: Peter Vagt

Subject: Cross Reference of U.S. EPA Review Comments
to Revised Upper Aquifer Tech Memo
ACS NPL RD/RA Pre-Design Investigation

At your request, I am providing a marked up copy of the text and tables from the Revised Upper Aquifer Technical Memorandum. The mark-ups indicate the specific locations in the text and tables where U.S. EPA comments, dated April 29, 1996, were addressed.

This mark up can be used in conjunction with the cover letter provided with the revised Technical Memorandum, submitted on May 3, 1996.

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TECHNICAL MEMORANDUM
UPPER AQUIFER INVESTIGATION
ACS NPL SITE PRE-DESIGN
(REVISED: MAY 3, 1996)

This Technical Memorandum presents the results, conclusions, and recommendations from the Upper Aquifer Investigation conducted at the ACS NPL site in Griffith, Indiana between February 5 and March 4, 1996. The purpose of the Upper Aquifer Investigation was to delineate the extent of groundwater contamination in the upper aquifer and to propose additional upper aquifer monitoring well locations at the site, if necessary. Groundwater samples were collected from 110 temporary sampling points with a hydraulic probe and analyzed for target VOCs using a field gas chromatograph (GC). The target VOC list included the most frequently detected VOCs in Site groundwater (benzene, ethylbenzene, toluene, xylene, chlorobenzene, 1,2-dichloroethene, and 1,1-dichloroethane). The results of the analyses were utilized to locate additional sampling points and delineate the extent of VOC contamination in the upper aquifer.

The Upper Aquifer Investigation was conducted in accordance with the Scope of Work and Specific Operating Procedures (SOPs) approved by U.S. EPA and IDEM. Investigation activities were divided and focused on four areas of the site labeled A, B, C, and D on Figure 1. These areas correspond to the following:

- A - Wetland Area West of the ACS Facility
- B - East of Colfax, South of Reder Road
- C - Southwest of the Griffith Landfill
- D - North and East Perimeter

Sampling locations utilized for the Upper Aquifer Investigation are shown on Figure 2. In this Technical Memorandum, objectives and sampling locations are initially presented according to area, followed by a summary of the sampling procedures utilized for the investigation. Results and conclusions for each area are subsequently presented followed by recommendations for completing the upper aquifer investigation and placement of additional upper aquifer monitoring wells at the site.

Although not included in the Scope of Work for the Upper Aquifer Investigation, three additional tasks were completed during the investigation and reported in this document. In response to U.S. EPA concerns regarding groundwater elevation data in the upper aquifer, top-of-casing elevations were resurveyed at piezometer P-52 and monitoring well MW-18 to verify the groundwater elevations measured in these wells. The resurveyed top-of-casing elevations for these two wells are 636.66 feet (NGVD) and 644.89 feet, respectively. The revised survey information for these two wells was utilized to plot the upper aquifer groundwater elevation presented in Figures 1 through 6. The groundwater elevation used for this plot was measured at the site on October 30, 1995. The resurveyed elevations for

these two wells resulted in a minor change in the orientation of the contour lines defining the water table in the wetland area east of the ACS Site. The revised water table contour lines changed from a more north-south orientation to generally east-west, indicating that the direction of groundwater flow is more southerly than easterly in the wetland area. #9

The second task added during the course of the investigation was the identification of private wells located east of Colfax Avenue, and south of Reder Road. This information is included along with recommendations to sample four private wells on page 11.

The third task involved collection and field analysis of a surface water sample collected near piezometer P63. The analytical results of the surface water sample are presented at the conclusion of the document.

SAMPLING OBJECTIVES AND LOCATIONS

Area A - Wetland Area West of the ACS Facility

Direction of groundwater flow in the upper aquifer in Area A is generally to the west and southwest from the ACS facility. Because monitoring wells have not been placed to the west (downgradient) of wells MW-13 and MW-9 located at the edge of the wetland area, the extent of contaminated groundwater had not been defined in the area. The objectives of the Area A investigation were to:

1. Establish the line to the west of Area A which defines the extent of contamination as indicated by "zero" VOC concentrations (non-detect) in groundwater.

2. Determine whether VOC contamination extends below the upper five feet in the upper aquifer at selected locations along the plume front.

To accomplish these objectives, 22 shallow and eight deep upper aquifer groundwater samples were collected and analyzed for target VOCs. Sampling locations GP50 through GP71 and GP115 on Figure 2 show the locations of the shallow (five feet below the watertable) groundwater sampling locations. Deep groundwater samples were collected at a depth of approximately 10 feet below the watertable at locations GP50, GP51, GP52, GP57, GP66, GP68, GP70 and GP71 (Figure 2). The locations of the deep groundwater samples were selected by the U.S. EPA. Sampling points were generally oriented in lines perpendicular to the north and south railroad right-of-ways at a spacing of approximately 100 feet between samples (based on field accessibility). #12

Area B - East of Colfax, South of Reder Road

The hydraulic gradient in Area B is generally to the south, with some southwestern orientation in the vicinity of a groundwater high near MW-18. VOC concentrations previously detected in wells MW-6 and MW-19 indicated that upper aquifer contamination may extend from MW-6 to beyond MW-19. (Monitoring well locations are plotted on Figure 1.) Prior to starting the investigation, several industrial facilities along the south side of Reder Road and a former UST located in the City of Griffith yard were identified as

potentially contributing to the VOC contamination detected in MW-6 and MW-19. The objectives of sampling Area B included:

1. Delineate the extent of VOC concentrations east and south of MW-19.

2. Evaluate the potential for the UST and several industrial facilities located in the area to be contributing to the VOC plume detected at MW-19.

To meet these objectives, 45 groundwater samples were collected and analyzed for target VOCs. Sampling locations GP80 through GP89, GP116 through GP124, GP126 through GP136, GP143 through GP147, and GP150 to GP161 correspond to the sampling locations utilized for the Area B investigation (Figure 2). Sampling was generally conducted in areas near the former UST and the intersection of Reder Road and Colfax Avenue, in an area east of piezometer P61, and in grid-like manner south of a line between monitoring well MW-19 and piezometer P62. Except for samples collected near the former UST, the spacing of samples was approximately 200 feet wherever practicable.

Area C - Southwest of the Griffith Landfill

Because trace levels of VOCs were detected in MW-15, there was a question whether VOCs may be present in the groundwater outside the landfill zone between monitoring wells M-1S and MW-15. The hydraulic gradient in Area C is generally to the southwest (Figure 1). The objective of the Area C investigation was to determine if VOCs are migrating southwest of the landfill between monitoring wells M-1S and MW-15.

Seven groundwater samples were collected along the abandoned railroad right-of-way between Colfax Avenue and M-1S. Two additional groundwater samples were collected on private property located southwest of the railroad right-of-way. The sampling locations are designated as samples GP73 through GP79, GP148, and GP149 on Figure 2.

Area D - North and East Perimeter

Previous data collected in 1990 from the north and east side of the ACS site suggested that the outer extent of groundwater contamination was defined by a line extending from MW-18 to the south, approximately 200 feet east of MW-12, and to the northeast by MW-11. Based on water level measurements collected in the area, the upper aquifer groundwater generally flows to the north from MW-18, northwest in the vicinity of MW-11 and flows westerly towards MW-13 (Figure 1). The extent of VOC concentrations around the north and east perimeter is apparently limited by the groundwater flow system in the area. The objective of the Area D investigation was to:

1. Confirm the extent of VOC concentrations in the upper aquifer around the north and east perimeter of the site.
2. Delineate the outer extent of contaminated groundwater in the upper aquifer.

Thirteen groundwater samples were collected in the area east of Colfax Avenue (samples GP90 through GP99 and GP101 through GP103) and 20 samples were collected north of

the railroad tracks, north of the ACS site (samples GP100, GP104 through GP114, GP125, and GP137 through GP144). The locations of the samples are shown on Figure 2. In general, samples were collected in a linear fashion east of Colfax Avenue at a spacing of approximately 200 feet. In the north perimeter area, samples were also collected at an approximate 200 foot spacing as allowed by field accessibility.

PROCEDURES

Field Sampling

Upper aquifer groundwater sampling from the hydraulic probes was conducted in accordance with the SOP for the Upper Aquifer Investigation (revision: January 19, 1996) with the following exceptions:

- The number of shallow groundwater samples collected during the Upper Aquifer Investigation in all of the areas was expanded to include additional sample locations. The total number of sampling locations increased from the 50 locations estimated in the Work Plan to 110 locations utilized for this investigation.

- The number of samples collected from a depth of ten feet below the watertable in the upper aquifer in Area A increased from the two specified in the Work Plan to eight locations, including six requested by the U.S. U.S. EPA during the investigation (GP52A, GP57A, GP66A, GP68A, GP70A, and GP71A).

- The originally planned "deep" samples were collected at GP50A and GP51A. Because clay was found to be located at less than a ten foot depth, these samples were collected at a depth of 9 and 7 feet below the water table respectively.

- Sample GP115 was added at U.S. U.S. EPA request, between GP70 and the landfill.

- No samples were collected from locations GP131 and GP147 because water could not be drawn through the fine sand clogged geoprobe screen.

- Purge volumes were reduced for some low-yielding sample locations, including GP112, GP121, GP122, GP131, GP132, GP153, GP157, GP160, and GP161.

- The sample from GP54 was not analyzed because the odor and color indicated that it was contaminated. A groundwater sample was subsequently collected approximately 100 feet west of this location to delineate the extent of contamination (GP53).

- Two samples were collected from a depth of four feet rather than five feet below the watertable due to inadvertent placement of the slotted screen at GP91 and GP119.

- Water could not be collected from the five foot depth at location GP145, so the probe was driven and additional two feet in depth and the sample was collected from a depth of seven feet.

- A sample could not be collected at location GP72 because of cold weather conditions. A sample was subsequently collected in the same area, and identified as GP80.

- Two sampling locations, GP87 and GP90, yielded foamy samples, so zero-headspace samples could not be collected. The samples were brought to the field GC for immediate analysis from these locations.

- As a result of fine sand clogging the well point used in accordance with the SOP, water samples obtained from GP151 through GP161 were collected by advancing a finely slotted screen (0.010 inch slotted rod 36 inches long by 0.76-inch diameter) enclosed inside the lead probe to the desired sampling depth (5 feet below the watertable). The probe casing was retracted from around the screen, exposing the screen in the aquifer. Water samples were then collected from the probe in accordance with the approved SOP.

Field GC Analysis

The approved SOP for the Upper Aquifer Investigation required that upper aquifer samples be analyzed for the compounds: benzene, ethylbenzene, toluene, xylene, chlorobenzene, 1,2-dichloroethene (1,2-DCE), and 1,1-dichloroethane (1,1-DCA). The following were also included in the analysis for the upper aquifer investigation:

- 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), tetrachloroethene (PCE), acetone, methyl isobutyl ketone (MIBK), methyl ethyl ketone, carbon tetrachloride, and styrene.

These compounds were added to the analyte list since the GC was already calibrated to analyze for these analytes for the Lower Aquifer Investigation.

) additional text

RESULTS AND CONCLUSIONS

Table 1 presents the location coordinates and sampling depths of the upper aquifer groundwater samples. Field analytical results for benzene, acetone, BETX and total VOCs are presented in Table 2. Because benzene and acetone were most frequently detected in shallow groundwater at the site, concentrations of benzene and acetone are also plotted on Figures 3 and 4, respectively. Figure 5 shows the plot of total VOC concentrations detected at the sampling points (total VOCs corresponds to the sum total of target VOCs detected with the field GC). Field GC analytical reports for the target compounds in all samples are tabulated in Appendix A. Data quality associated with the Upper Aquifer Investigation was in accordance with the approved SOW and SOP. A discussion of the analytical results and

) #1

) #14

conclusions associated with the Upper Aquifer Investigation is presented according to applicable area of the Site (i.e., A, B, C, or D).

Acetone Discussion Removed

Area A - Wetland Area West of the ACS Facility

Results

#14 #16

VOCs, primarily benzene and acetone, were detected in the wetland area west of the ACS facility. Figures 3 and 4 show the concentrations of benzene and acetone detected in the area, respectively. Acetone was the most prevalent VOC detected in Area A found in 11 samples (Figure 4). The highest level of acetone was found in GP58 where acetone was detected at an estimated concentration of 50,600 ug/L. However, at a distance of approximately 100 feet west and southwest of this location, acetone was not detected above quantitation limits. South of GP58 and GP60, acetone was detected at significantly lower concentrations (Figure 4).

Benzene was only detected in three samples in the wetland, GP53, GP55, and GP57, at concentrations of 550 ug/L, 5000 ug/L and 400 ug/L, respectively. Other VOCs detected in groundwater samples collected from GP53 and GP55 include cis- and trans-1,2-DCE and toluene (Appendix A).

A comparison of the eight deeper groundwater samples collected adjacent to shallow samples is shown in Table 3. At GP57, both benzene and acetone were detected at higher concentrations in the 10 foot deep sample compared to five foot deep sample. At the other nested sample locations, acetone was the only VOC detected in samples (GP50, GP68) and was found at slightly higher concentrations in the deep samples. No VOCs were detected in either the shallow or the deeper samples collected at GP51, GP52, GP66, GP70 and GP71.

Conclusions

#17 #18

The approximate extent of contamination in the upper aquifer has been defined in the wetland area west of the ACS facility. A line of "zero" VOC concentrations ("zero" is defined as concentrations of VOCs below detection limits) was established in the upper aquifer by samples (from north to south) GP62, GP61, GP66, GP52, GP71, GP51 and GP70. This is consistent with Objective #1 established for the Area A investigation.

The line of "zero" contamination forms a sharp boundary which coincides with the border between the wetland area to the west and dry land to the east. In the area near GP57, benzene concentrations sharply decreased from 5000 ug/L at GP57 to less than detection limits at GP58 located approximately 100 feet west. Other areas exhibit a similar abrupt decrease in contaminant concentration over a relatively small distance. This sharp boundary is unlike other areas of the site which typically exhibit groundwater contamination as a gradational zone. The sharp contrast between contaminated and non-contaminated groundwater in Area A is likely due to the wetland area acting as a discharge boundary for the upper aquifer groundwater flow system. Where there is standing water, there will be essentially no horizontal gradient and therefore, no driving force to push the benzene contaminated water further out into the wetland.

simplification of wording

The results of the deep groundwater samples in the upper aquifer indicate that VOC sampling five feet below the water table provide results that are representative of the entire saturated thickness of the upper aquifer. This is evidenced by the lack of VOC detections in shallow and deep groundwater samples GP51/GP51A, GP52/GP52A, GP66/GP66A, GP70/GP70A and GP71/GP71A which are located downgradient of samples containing higher concentrations of VOCs. This data shows that objective #2 for Area A has been met.

Area B - East of Colfax, South of Reder Road

Results

VOCs were detected in many of the groundwater samples collected in Area B (Table 2). Figures 3 and 4 show the concentrations of benzene and acetone, respectively, detected in the area. The highest VOC concentrations were found in groundwater samples collected just north of the UST located at the City of Griffith landfill and south of the intersection of Colfax and Reder Roads. Benzene was detected as high as 6,950 ug/L near the former UST (GP124), and was also found at elevated concentrations south of Reder Road (4,580 ug/L in GP121, and 3,430 ug/L in GP82). Acetone was detected near the UST, ranging in concentration from 3,900 ug/L in GP87 to 6,000 ug/L in GP123, and south of Reder Road at concentrations ranging from 834 ug/L in GP122 to 4,780 ug/L in GP121 (Figure 4). Other VOCs detected in the area include 1,2-dichloroethane, 1,1,1-TCA, toluene, ethylbenzene, xylenes and styrene (Appendix A).

South of the intersection of Colfax and Reder Roads, the highest concentrations of VOCs, primarily benzene, acetone, ethylbenzene and xylene, were detected at GP116, GP120, GP128 and GP134. These sampling locations are generally located in a north-south line approximately 600 to 700 feet east of Colfax Road (see Figure 2). East and west of this line, VOCs were either generally not detected or found at concentrations significantly less than the central line. VOCs were not found in GP84, GP85, GP86, and GP132 to the east of this line, whereas to the west, VOCs were not detected in GP118, GP129, GP135 and GP145 (Table 2).

Benzene concentrations in the central plume decreased from GP82 (3,430 ug/L) to the north to GP120 (131 ug/L), then increased again to the south from GP120 (131 ug/L) to GP128 (506 ug/L) to GP134 (1100 ug/L). South of GP134, benzene concentrations decreased again at GP143, GP144 and GP156 (Figure 3). The southern and southeastern extent of benzene contamination in the upper aquifer was delineated by groundwater samples collected at GP151 to GP155 and GP158 and GP159. Benzene was not detected at sample locations GP135 and GP145 located further to the west.

Acetone concentrations generally decreased with distance to the south from the site (Figure 4). The southernmost detection of acetone occurred at GP156, located approximately 1600 feet southeast of the intersection of Colfax and Reder roads, where acetone was detected at 34 ug/L. Acetone was not detected in GP118, GP129 GP144, and GP155 to the west, GP159 and GP158 to the southeast, and GP85, GP132, GP151, and GP152 and to the east.

Two isolated detections of acetone occurred at GP153 and GP157 where acetone was found at 15 ug/L and 38 ug/L, respectively.

Conclusions

There are several potential sources of elevated BETX concentrations upgradient of monitoring well MW6, near the intersection of Colfax and Reder Roads. Possible sources include the UST area at the City of Griffith garage, the Off-Site Containment area and the area designated as the Kapica-Pazmey area in the RI. It appears that there is a zone of VOC contamination in the upper aquifer extending from the Kapica-Pazmey area, south from monitoring well MW-6 to MW-19 and beyond.

#21

* Deleted Paragraph

* The approximate extent of VOC contamination in the upper aquifer south of Reder Road was defined during the investigation. A line of "zero" VOC detections can be established in the upper aquifer by samples which surround the plume of benzene and acetone to the west, south and east. This is consistent with Objective #1 established for the Area B investigation. With respect to Objective #2, the UST area in the Griffith town yard cannot be ruled out as an additional source of benzene.

#20

Area C - Southwest of Griffith Landfill

Results

Acetone was the only VOC detected in Area C at three sampling locations. The acetone concentrations range from 34 ug/L in GP73 to 57 ug/L in GP74. Concentrations of acetone detected in GP73 and GP74 were not detected in groundwater samples collected 200 feet southwest (Figure 4).

Conclusions

Acetone was the only VOC sporadically detected in this area at concentrations less than 57 ug/L. Acetone was selected as a contaminant of concern for the ACS Site in the Record of Decision (ROD). However, when comparing the concentration of acetone detected at GP74 (57 ug/L) to the 'Final Remediation Level" for acetone in the ROD (2,300 ug/L), the detected concentrations of acetone in Area C are well below these levels.

#22

Area D - North and East Perimeter

Results.

East of Colfax Road, VOCs were detected in groundwater samples collected from GP90, GP91, GP92, GP93 and GP94. The highest VOC concentrations were found in GP90, located near the intersection of Colfax and Reder Roads, where cis-1,2-DCE, total BETX, and MIBK were detected at 25,700 ug/L, 52,720 ug/L and 8,960 ug/L, respectively (Appendix A). At GP91, located 200 feet north of GP90, total VOC concentrations decreased to 16.2 ug/L, and at GP101, located approximately 400 feet east, VOCs were not detected.

VOCs were detected above quantitation limits in only one of the upper aquifer groundwater samples collected east of the north-south line of points defined by GP90 to GP93. The VOC, 1,2-DCA, was detected at a concentration of 10 ug/L in GP94 (Appendix A).

North of the ACS site in Area D, VOCs were detected in samples GP104 through GP108, GP112, GP114, GP139 and GP140 (Table 2). The highest VOC concentrations were detected in samples GP105 and GP107, where total VOCs were 327 ug/L and 6,213 ug/L, respectively (Table 2). These samples contained several VOC constituents, including acetone, benzene, 1,1-DCA, cis-1,2-DCE, and MIBK above the quantitation limit. The distribution of benzene and acetone in the north perimeter area is presented in Figures 3 and 4, respectively. Benzene was detected only in GP105, GP106 and GP107, whereas acetone was detected in samples collected throughout the area (Figure 4). In samples GP139 and GP140, acetone was the only compound detected in the groundwater samples.

Conclusions

The approximate extent of impacted groundwater has been defined along the east perimeter of the ACS site by the Upper Aquifer Investigation. The absence of VOC detections in samples GP95 through GP101 indicates that VOCs have not migrated beyond 300 feet east of Colfax Road. This is consistent with both the results of previous investigations and the upper aquifer groundwater flow system in the area (Objective #1). Groundwater flow in a northerly direction on the east perimeter of the ACS site appears to provide a hydraulic barrier to eastward migration of VOCs (Figure 1). #23

The approximate extent of benzene contamination north of the ACS site is defined by groundwater samples from locations GP108, GP139 to GP140, GP113 and GP104 (Figure 3). With exceptions of the detection of acetone in several samples and MIBK detected in GP108, the extent of the benzene plume also corresponds to the outer limits of VOC contamination (Objective #2). The extent of acetone detections was not defined to a "zero" line north of samples GP139 and GP140 in the perimeter area. The low level detections of acetone appear to decrease to the north onto LaSalle Steel property. (Monitoring wells planned for this area will provide further data for the final clarification of the acetone anomaly.) #24

RECOMMENDATIONS

Based on the results and conclusions of the Upper Aquifer Investigation, the overall objective of the investigation, to delineate the extent of upper aquifer contamination sufficiently to locate the placement of additional monitoring wells, has been satisfied around the site.

The following actions are proposed to complete the delineation of upper aquifer VOC contamination.

Area A - The approximate extent of VOC contamination has been defined by a series of closely spaced (100 foot) sampling locations. The sampling showed a clear

delineation between the zones of contamination and non-contamination. VOC contamination does not extend westward, beyond the edge of the wetland. Because of the clear delineation of VOC contamination, and the difficulties inherent in constructing monitoring wells within the wetlands, no additional monitoring wells are warranted in this area. However, in a letter dated April 29, 1996, U.S.EPA is requiring that one monitoring be installed in Area A at the location labeled as J on Figure 6. A copy of the U.S. EPA letter is attached as Appendix D. #26

Also, as required in the April 29, 1996 letter, U.S.EPA is requiring that seven to eight piezometers be installed at four locations as piezometer nests in Area A. Each piezometer nest would consist of two piezometers each. One piezometer would be installed at the base of the upper aquifer and a second would be installed at the water table surface. If appropriate, existing piezometer P-23 may be used as one piezometer as one location. The piezometer nest locations, N-1, N-2, N-3 and N-4, are shown on Figure 6. #26

Area B - Four monitoring wells are proposed to supplement existing well MW-19 in defining the limits of VOC contamination in this area. The preliminary locations of the four wells, labeled E, F, G, and H, are shown on Figure 6. The wells will be installed in close proximity to the location where shallow groundwater samples were collected at GP135, GP159, GP151 and GP155. These locations have been selected to surround the VOC plume and provide an indication of whether the extent of contamination is remaining constant or expanding. Final locations will be selected in the field, based on accessibility, with concurrence from the U.S. EPA, its field oversight subcontractor and IDEM.

Monitoring well, I, will be located in the central portion of the plume to monitor the nature of contamination within the plume. This well will be located near GP134 where elevated concentrations of benzene were detected. #26

In a letter dated April 29, 1996, U.S. EPA is requiring one additional monitoring well in Area B (Appendix D). This monitoring well is labeled as K on Figure 6.

The actual locations of all Area B wells will be selected in the field, based on accessibility, with concurrence from the U.S. EPA, its field oversight subcontractor and IDEM.

Area C - No monitoring wells are proposed for the southwest side of the landfill. Acetone was the only VOC sporadically detected in this area at concentrations less than 57 ug/L. This concentration is significantly less than the "Final Remediation Level" listed in the ROD for acetone which is 2,300 ug/L. Two existing monitoring wells located in Area C (M-1S, MW15; Figure 1) will

Acetone Discussion modified

#25

continue to serve as sentinel wells for monitoring potential contaminant migration southwest of the landfill area should such monitoring become appropriate.

Area D - Four additional monitoring wells screened in the upper aquifer are proposed along the north and east sides of the site. The locations, labeled A, B, C, and D on Figure 6, have been selected at the boundaries of the VOC plume in this area. The proposed wells will act as sentinel wells, providing an indication whether the extent of contamination is remaining constant or expanding.

In a letter dated April 29, 1996, U.S. EPA is requiring two additional monitoring wells in Area D (Appendix D). The locations of these wells, labeled as L and M, are shown on Figure 6.

Final locations of Area D monitoring wells will be selected in the field, based on accessibility, with concurrence from the U.S. EPA, its field oversight subcontractor and IDEM.

UPPER AQUIFER INVESTIGATION SOPs

Additional predesign investigation of the upper aquifer will include installation, development and sampling of upper aquifer monitoring wells, and sampling of residential wells (see below). SOPs developed for performing these tasks are included in Appendix C. The analytical parameters for the proposed upper aquifer sampling are summarized in Table 4.

RESIDENTIAL WELL IDENTIFICATION AND SAMPLING

Due to the dimensions of the VOC plume east of Colfax and south of Reder Road, locations of residential wells in this area were identified which may be potentially susceptible to VOC migration along the well casing from the upper aquifer to the lower aquifer (lower aquifer is the formation in which the residential wells are screened). Four residential wells have been identified in the area and are listed below:

- 1002 Reder Road
- 430 East Avenue H
- 940 Arbogast
- 938 Arbogast

The locations of the properties are shown on Figure 6. It is recommended that water samples be collected from these four residential to coincide with the collection of groundwater samples from the new monitoring wells proposed in this Technical

Memorandum. Water samples from these four wells will be analyzed for full scan TCL/TAL list. An analytical summary is presented in Table 4. A full scan will be performed on these four well although if the analytical results do not show detections of semi-volatiles, metals or other non-volatile constituents, any future residential well sampling should require VOC analysis only.

The locations of other private wells located in the vicinity of the upper aquifer VOC plume southeast of the ACS Site are presented in the May 1996 Lower Aquifer Investigation report. Surrounding well locations are plotted on Figure 8 of the Lower Aquifer Technical Memorandum and a summary of updated private well information is presented in Table 11 of the Lower Aquifer Technical Memorandum. #27

A schedule for installing and sampling the new upper aquifer monitoring and for sampling the residential wells will be prepared and submitted to the Agencies ten days after this Upper Aquifer Investigation report is approved.

SURFACE WATER SAMPLE

One surface water sample was collected near P63, north of the ACS facility. The location of the surface water sample is shown on Figure 5. The sample was taken from standing surface water adjacent to a ditch that flows beneath the railroad tracks from properties north of the site (i.e., LaSalle Steel) towards the wetland area (Area A). The water sample was analyzed with the field GC and found to contain benzene at 1100 ug/L. No other VOCs were detected in the water sample. #28 #29

Surface water sampling at the ACS Site was originally included in the Pre-Design Work Plan as the Wetland Investigation. Collection and field GC analysis of a surface water sample during the Upper Aquifer Investigation served to provide notice that a Wetland Investigation, as described in the Pre-Design Work Plan and discussed with James Chapman of the U.S. EPA, is indeed needed at the site to determine the nature and extent of surface water impacts. Additional sampling in the wetland area will be conducted during the summer, following U.S. EPA final approval of the Wetland Investigation SOW and SOP. #29

Attachments:

Table 1. Summary of Sampling Coordinates and Depths
Table 2. Tabulation of Selected VOC Detections
Table 3. Comparison of Shallow and Deep Groundwater Samples in the Upper Aquifer
Table 4. Summary of Monitoring Well Analytical Parameters

Figure 1. Upper Aquifer Sampling Areas
Figure 2. Upper Aquifer Sampling Points
Figure 3. Upper Aquifer Plot of Benzene Detections (ug/L)
Figure 4. Upper Aquifer Plot of Acetone Detections (ug/L)
Figure 5. Total VOC Concentrations in Upper Aquifer (ug/L)
Figure 6. Location of Proposed Monitoring Wells and Residential Well Sampling

Appendix A. Tabulation of VOC Analyses with Field GC
Appendix B. Field GC Printouts and Plots (available upon request)
Appendix C. Upper Aquifer Investigation SOPs
Appendix D. April 29, 1996 letter from U.S. EPA

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Table 1. Summary of Sample Coordinates and Depths
ACS NPL Site

Probe No.	East feet	North feet	Approx. G.W. Level feet	Approx. Sample Depth feet
GP50	4756.5	7309.0	3.0	8.0
GP-50A	4756.5	7309.0	3.0	12.0
GP51	4568.2	7240.7	1.5	6.5
GP-51A	4568.2	7240.7	1.5	8.5
GP52	4813.6	7857.5	0.5	5.5
GP52A	4687.4	7519.2	0.5	10.5
GP53	5042.0	7618.2	1.5	6.5
GP55	5026.8	7451.6	1.0	6.0
GP56	4994.1	7750.3	1.0	6.0
GP57	4938.8	7658.5	1.5	6.5
GP57A	4938.8	7658.5	1.5	11.5
GP58	4829.8	7705.0	1.0	6.0
GP59	4751.7	7615.9	1.0	6.0
GP60	4830.7	7537.2	1.5	6.5
GP61	4741.4	7752.7	1.0	6.0
GP62	4687.4	7519.2	1.5	6.5
GP63	4855.1	7259.5	1.5	6.5
GP64	4798.0	7166.3	1.0	6.0
GP65	4763.6	7087.3	1.0	6.0
GP66	4716.0	7632.5	1.0	6.0
GP66A	4716.0	7632.5	1.0	11.0
GP67	4723.3	7432.8	1.0	6.0
GP68	4731.6	7032.7	2.5	7.5
GP68A	4731.6	7032.7	2.5	12.5
GP69	4747.1	7168.2	2.0	7.0
GP70	4616.5	7064.6	1.5	6.5
GP70A	4616.5	7064.6	0.0	10.0
GP71	4628.8	7420.4	0.5	5.5
GP71A	4628.8	7420.4	0.0	10.0
GP72	5472.9	5563.3	ns	ns
GP73	4797.3	4726.1	5.0	11.0
GP74	4698.9	4904.4	4.5	11.0
GP75	4606.8	5082.5	5.5	11.0

#31 Sample location was not surveyed for GP54, since it was not analyzed

Table 1. Summary of Sample Coordinates and Depths
ACS NPL Site

Probe No.	East feet	North feet	Approx. G.W. Level feet	Approx. Sample Depth feet
GP76	4509.4	5257.8	5.0	10.0
GP77	4395.7	5420.9	4.5	10.5
GP78	4305.3	5619.1	5.0	10.0
GP79	4212.7	5795.8	5.0	10.0
GP80	5472.9	5563.3	19.0	24.0
GP81	5622.8	5547.8	15.0	20.0
GP82	5621.1	5352.5	9.0	14.0
GP83	5822.3	5356.9	9.0	14.0
GP84	5797.9	5171.7	9.0	14.0
GP85	5806.4	4972.5	5.0	10.0
GP86	5976.4	5043.0	6.0	11.0
GP87	5111.6	5523.4	10.0	15.0
GP88	5160.6	5368.9	13.0	18.0
GP89	5118.5	5565.8	21.0	26.0
GP90	5538.8	5705.9	19.0	24.0
GP91	5610.7	5891.5	17.0	21.0
GP92	5725.9	6086.7	13.0	18.0
GP93	5802.3	6267.1	11.0	16.0
GP94	6149.4	6280.2	10.0	15.0
GP95	6230.7	6472.2	4.0	9.0
GP96	6298.7	6648.4	4.0	9.0
GP97	6295.1	6832.1	4.0	9.0
GP98	6350.2	7046.3	4.0	9.0
GP99	6410.4	7280.7	6.0	11.0
GP100	6405.0	7678.9	6.0	11.0
GP101	5944.6	5706.5	10.0	15.0
GP102	5994.6	5905.4	10.0	15.0
GP103	6062.3	6086.4	3.0	8.0
GP104	6217.2	7736.6	3.0	8.0
GP105	6002.5	7753.3	4.0	9.0
GP106	5818.0	7827.9	3.0	8.0
GP107	5581.7	7906.7	2.0	7.0
GP108	5398.0	7984.1	2.0	7.0
GP109	5195.9	7973.0	3.0	8.0

Table 1. Summary of Sample Coordinates and Depths
ACS NPL Site

Probe No.	East feet	North feet	Approx. G.W. Level feet	Approx. Sample Depth feet
GP110	4949.6	8072.4	4.0	9.0
GP111	6368.8	7845.2	5.0	10.0
GP112	6138.2	7961.0	3.0	8.0
GP113	5985.9	7954.8	4.0	9.0
GP114	5794.2	8025.5	4.0	9.0
GP115	4592.5	6905.3	6.0	11.0
GP116	5651.9	4835.4	5.0	10.0
GP117	5435.5	4793.5	2.0	7.0
GP118	5084.4	4798.9	4.0	9.0
GP119	5777.1	4741.2	5.0	9.0
GP120	5594.5	4625.2	1.5	6.5
GP121	5393.1	5512.7	21.0	26.0
GP122	5305.8	5361.2	15.0	20.0
GP123	5114.8	5612.9	21.0	26.0
GP124	5231.1	5606.3	22.0	27.0
GP125	6234.4	7399.7	10.0	15.0
GP126	5889.3	4782.9	3.0	8.0
GP127	5816.6	4591.6	4.0	9.0
GP128	5587.7	4518.1	3.0	8.0
GP129	5392.9	4629.7	3.0	8.0
GP130	5275.9	4790.1	4.0	9.0
GP131	6088.4	4830.5	ns	ns
GP132	6056.7	4630.5	4.0	9.0
GP133	5929.2	4450.4	5.0	10.0
GP134	5737.9	4367.5	4.0	9.0
GP135	5489.0	4348.2	7.0	12.0
GP136	5398.1	4501.4	3.0	8.0
GP137	6252.8	8061.6	4.5	9.5
GP138	6039.3	8131.7	3.0	8.0
GP139	5877.2	8195.5	4.0	9.0
GP140	5650.8	8208.5	5.0	10.0
GP141	5458.5	8139.6	4.0	9.0
GP142	5229.5	8092.5	6.0	11.0
GP143	5923.7	4120.5	5.0	10.0

Table 1. Summary of Sample Coordinates and Depths
ACS NPL Site

Probe No.	East feet	North feet	Approx. G.W. Level feet	Approx. Sample Depth feet
GP144	5735.3	4126.4	4.0	9.0
GP145	5545.9	4217.0	5.0	12.0
GP146	5728.0	3713.4	4.0	9.0
GP147	5737.9	3303.0	ns	ns
GP148	4571.6	4681.2	9.0	14.0
GP149	4495.9	4858.4	6.0	11.0
GP150	4971.8	4804.2	4.0	9.0
GP151	6125.5	4434.9	4.0	9.0
GP152	6186.9	4209.7	4.0	9.0
GP153	5616.1	4023.2	1.0	6.0
GP154	5696.9	3863.9	2.0	7.0
GP155	5907.7	3879.7	2.5	7.5
GP156	6077.8	4003.6	2.0	7.0
GP157	5511.0	3980.2	1.0	6.0
GP158	6296.3	3994.5	3.0	8.0
GP159	6147.1	3809.8	2.0	7.0
GP160	5511.0	3877.1	1.0	6.0
GP161	5413.9	4054.1	0.5	5.5

notes:

1. ns - no sample collected
2. No sample collected from GP72. Sample obtained from same location later and renamed GP80.
3. Sample collected from GP54 was not analyzed due to high concentrations. Location of GP54 was not surveyed.

Table 2. Tabulation of Selected VOC Detections (revised)
Upper Aquifer Investigation, ACS NPL Site

#32

Probe Number	Coordinates Easting	Coordinates Northing	Acetone (ug/L)	Benzene (ug/L)	BETX (ug/L)	Total VOCs (ug/L)
GP50	4756.5	7309.0	19	nd	nd	19
GP51	4568.2	7240.7	nd	nd	nd	nd
GP52	4813.6	7857.5	nd	nd	nd	nd
GP53	5042.0	7618.2	210	550	573	813
GP55	5026.8	7451.6	15	400	400	420
GP56	4994.1	7750.3	6,700	nd	nd	6,700
GP57	4938.8	7658.5	770	5,000	5,000	5,770
GP58	4829.8	7705.0	50,600	nd	nd	50,600
GP59	4751.7	7615.9	11	nd	nd	11
GP60	4830.7	7537.2	3,560	nd	nd	3,560
GP61	4741.4	7752.7	nd	nd	nd	nd
GP62	4687.4	7519.2	nd	nd	nd	nd
GP63	4855.1	7259.5	nd	nd	nd	nd
GP64	4798.0	7166.3	12	nd	nd	12
GP65	4763.6	7087.3	nd	nd	nd	nd
GP66	4716.0	7632.5	nd	nd	nd	nd
GP67	4723.3	7432.8	715	nd	nd	715
GP68	4731.6	7032.7	17	nd	nd	17
GP69	4747.1	7168.2	nd	nd	nd	nd
GP70	4616.5	7064.6	nd	nd	nd	nd
GP71	4628.8	7420.4	nd	nd	nd	nd
GP72	5474.1	5558.7	ns	ns	ns	ns
GP73	4797.3	4726.1	34	nd	nd	34
GP74	4698.9	4904.4	57	nd	nd	57
GP75	4606.8	5082.5	nd	nd	nd	nd
GP76	4509.4	5257.8	nd	nd	nd	nd
GP77	4395.7	5420.9	nd	nd	nd	nd
GP78	4305.3	5619.1	31	nd	nd	31
GP79	4212.7	5795.8	nd	nd	nd	nd
GP80	5472.9	5563.3	nd	7,860	22,803	23,120
GP81	5622.8	5547.8	1,720	nd	13,868	18,803
GP82	5621.1	5352.5	4,450	3,430	21,550	29,460
GP83	5822.3	5356.9	nd	nd	17	17
GP84	5797.9	5171.7	nd	nd	nd	nd
GP85	5806.4	4972.5	nd	nd	nd	nd
GP86	5976.4	5043.0	nd	nd	nd	nd
GP87	5111.6	5523.4	3,900	410	660	4,560
GP88	5160.6	5368.9	159	nd	nd	159
GP89	5118.5	5565.8	2,910	1,060	6,560	9,470
GP90	5538.8	5705.9	3,960	8,260	52,720	93,010
GP91	5610.7	5891.5	nd	nd	6	16

Table 2. Tabulation of Selected VOC Detections (revised)
Upper Aquifer Investigation, ACS NPL Site

Probe Number	Coordinates Easting	Coordinates Northing	Acetone (ug/L)	Benzene (ug/L)	BETX (ug/L)	Total VOCs (ug/L)
GP92	5725.9	6086.7	82	nd	nd	82
GP93	5802.3	6267.1	43	5	5	53
GP94	6149.4	6280.2	nd	nd	nd	10
GP95	6230.7	6472.2	nd	nd	nd	nd
GP96	6298.7	6648.4	nd	nd	nd	nd
GP97	6295.1	6832.1	nd	nd	nd	nd
GP98	6350.2	7046.3	nd	nd	nd	nd
GP99	6410.4	7280.7	nd	nd	nd	nd
GP100	6405.0	7678.9	nd	nd	nd	nd
GP101	5944.6	5706.5	nd	nd	nd	nd
GP102	5994.6	5905.4	nd	nd	nd	nd
GP103	6062.3	6086.4	nd	nd	nd	nd
GP104	6217.2	7736.6	48	nd	nd	48
GP105	6002.5	7753.3	205	53	53	327
GP106	5818.0	7827.9	38	118	118	156
GP107	5581.7	7906.7	860	5,320	5,320	6,213
GP108	5398.0	7984.1	nd	nd	nd	6
GP109	5195.9	7973.0	nd	nd	nd	nd
GP110	4949.6	8072.4	nd	nd	nd	nd
GP111	6368.8	7845.2	nd	nd	nd	nd
GP112	6138.2	7961.0	172	nd	nd	172
GP113	5985.9	7954.8	nd	nd	nd	nd
GP114	5794.2	8025.5	53	nd	nd	53
GP115	4592.5	6905.3	nd	nd	nd	nd
GP116	5651.9	4835.4	240	710	5,926	6,216
GP117	5435.5	4793.5	175	nd	nd	175
GP118	5084.4	4798.9	nd	nd	nd	nd
GP119	5777.1	4741.2	17	5	5	32
GP120	5594.5	4625.2	719	131	376	1,095
GP121	5393.1	5512.7	4,780	4,580	11,840	16,620
GP122	5305.8	5361.2	834	nd	nd	834
GP123	5114.8	5612.9	6,000	1,590	3,680	18,600
GP124	5231.1	5606.3	3,810	6,950	6,950	10,760
GP125	6234.4	7399.7	nd	nd	nd	nd
GP126	5889.3	4782.9	51	nd	nd	67
GP127	5816.6	4591.6	13	nd	nd	19
GP128	5587.7	4518.1	nd	506	5,376	5,376
GP129	5392.9	4629.7	nd	nd	nd	nd
GP130	5275.9	4790.1	168	nd	nd	168
GP131	6088.4	4830.5	ns	ns	ns	ns
GP132	6056.7	4630.5	nd	nd	nd	nd
GP133	5929.2	4450.4	62	5	5	67

Table 2. Tabulation of Selected VOC Detections (revised)
Upper Aquifer Investigation, ACS NPL Site

Probe Number	Coordinates Easting	Coordinates Northing	Acetone (ug/L)	Benzene (ug/L)	BETX (ug/L)	Total VOCs (ug/L)
GP134	5737.9	4367.5	412	1,100	1,133	1,630
GP135	5489.0	4348.2	nd	nd	nd	nd
GP136	5398.1	4501.4	19	5	5	25
GP137	6252.8	8061.6	nd	nd	nd	nd
GP138	6039.3	8131.7	nd	nd	nd	nd
GP139	5877.2	8195.5	50	nd	nd	50
GP140	5650.8	8208.5	21	nd	nd	21
GP141	5458.5	8139.6	nd	nd	nd	nd
GP142	5229.5	8092.5	nd	nd	nd	nd
GP143	5923.7	4120.5	59	252	357	416
GP144	5735.3	4126.4	nd	172	172	172
GP145	5545.9	4217.0	nd	nd	nd	nd
GP146	5728.0	3713.4	nd	nd	nd	nd
GP147	5737.9	3303.0	ns	ns	ns	ns
GP148	4571.6	4681.2	nd	nd	nd	nd
GP149	4495.9	4858.4	nd	nd	nd	nd
GP150	4971.8	4804.2	nd	nd	nd	nd
GP151	6125.5	4434.9	nd	nd	nd	nd
GP152	6186.9	4209.7	nd	nd	nd	nd
GP153	5616.1	4023.2	15	nd	nd	15
GP154	5696.9	3863.9	nd	nd	nd	nd
GP155	5907.7	3879.7	nd	nd	nd	nd
GP156	6077.8	4003.6	34	39	39	73
GP157	5511.0	3980.2	38	nd	nd	38
GP158	6296.3	3994.5	nd	nd	nd	nd
GP159	6147.1	3809.8	nd	nd	nd	nd
GP160	5511.0	3877.1	nd	nd	nd	nd
GP161	5413.9	4054.1	nd	nd	nd	nd

notes:

1. nd - not detected
2. ns - no sample collected
3. total VOCs - sum total of target VOCs (Appendix A)

Table 3. Comparison of Shallow and Deep Groundwater Samples in Upper Aquifer ACS NPL Site

Probe No.	Approx. Sample Depth (ft)	Concentration (ug/L) Benzene	Acetone
GP-50	8.0	nd	19
GP-50A	12.0	nd	44
GP-51	6.5	nd	nd
GP-51A	8.5	nd	nd
GP-52	5.5	nd	nd
GP-52A	10.5	nd	nd
GP-57	6.5	5,000	770
GP-57A	11.5	44,700	1,400
GP-66	6.0	nd	nd
GP-66A	11.0	nd	nd
GP-68	7.5	nd	17
GP-68A	12.5	nd	348
GP-70	6.5	nd	nd
GP-70A	10.0	nd	nd
GP-71	5.5	nd	nd
GP-71A	10.0	nd	nd

Note: "A" designation indicates deep groundwater sample (i.e., 10 foot depth).

Table 4
Summary of Monitoring Well Analytical Parameters
American Chemical Service, Inc.
Griffith, Indiana

Well Number	TCL VOCs	Low Level TCL VOCs	TCL Semi-Volatile/PCBs	TAL Metals	
Monitoring Wells				total	dissolved
A	x		x	x	x
B	x		x	x	x
C	x		x	x	x
D	x		x	x	x
E	x		x	x	x
F	x		x	x	x
G	x		x	x	x
H	x		x	x	x
I	x		x	x	x
J	x		x	x	x
K	x		x	x	x
L	x		x	x	x
M	x		x	x	x
Residential Wells					
1002 Reder Road		x	x	x	x
430 East Avenue A		x	x	x	x
938 Arbogast		x	x	x	x
940 Arbogast		x	x	x	x

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